CLAIMS

1. A reflection optical device comprising:

plural reflection surfaces, and

a diaphragm for limiting light fluxes, which is disposed between an object and a reflection surface that is located closest to the object among the plural reflection surfaces, wherein

at least one of the plural reflection surfaces has an anamorphic shape, and the plural reflection surfaces are disposed eccentrically and light fluxes released from an object having a size not a spot are imaged to form an image having a size on an image surface, and,

the reflection optical device comprises a light shielding member for blocking light fluxes released from a place other than the object, which pass through the diaphragm and reach a pickup range on the image surface without being reflected by the plural reflection surfaces.

2. The reflection optical device according to claim 1, wherein the light shielding member is disposed between the object and the diaphragm.

3. The reflection optical device according to claim 2, wherein the light shielding member is a plate-shaped member having one end located at the side of the diaphragm and the other end extending toward the object.

4. The reflection optical device according to claim 3, wherein the light shielding member has an inclined surface for limiting light fluxes released from the object in the direction in which the light fluxes travel from the side of the object to the side of the diaphragm so that effective light fluxes, which form an image on the image surface, are not blocked.

5. The reflection optical device according to claim 2, wherein the light shielding member is integrated with the diaphragm.

6. The reflection optical device according to claim 1, wherein the plural reflection surfaces and the image surface are disposed inside the housing; the diaphragm is an aperture provided in the housing; and the light shielding member is disposed outside the housing.

7. The reflection optical device according to claim 1, wherein the number of the plural reflection surfaces is two; the shape of the two reflection surfaces is anamorphic; and when the two reflection surfaces are referred to as a first reflection surface and a second reflection surface in that order from the side of the object, the light shielding member is disposed in a space surrounded by an optical axis extending from the vertex of the first reflection surface to the vertex of the second reflection surface, an optical axis extending from the vertex of the second reflection surface to the center of the image surface, and a line connecting the center of the image surface and the vertex of the first reflection surface in a plane including the center of the image surface and the vertices of the two reflection surfaces.

8. The reflection optical device according to claim 7, wherein the outer shape of the light shielding member is adjusted so as not to block effective light fluxes that form an image on the image surface.

9. The reflection optical device according to claim 1, wherein the number of the plural reflection surfaces is four; and when the four reflection surfaces are referred to as a first reflection surface, a second reflection surface, a third reflection surface and a fourth reflection surface in that order from the side of the object, the light shielding member is disposed in a space surrounded by an optical axis extending from the vertex of the second reflection surface to the vertex of the third reflection surface, an optical axis extending from the vertex of the third reflection surface to the vertex of the fourth reflection surface, and a line connecting the vertex of the second reflection surface and the vertex of the fourth reflection surface in a plane including the center of the image surface and the vertices of the four reflection surfaces.

10. The reflection optical device according to claim 9, wherein the outer shape of the light shielding member is adjusted so as not to block the effective light fluxes that form an image on the image surface.

11. The reflection optical device according to claim 1, wherein the following relationship is satisfied:

$$3 \leq Wy \leq 30$$

where Wy (deg) denotes a half angle of view in the Y direction in a plane including vertices of the reflection surface in the rectangular coordinate system (X, Y) in which the X direction is a direction perpendicular to a plane including the center of the image surface and the vertices of the reflection surfaces and the Y direction is a tangential direction of the plane including vertices of the reflection surface at the vertex included in this plane.

12. The reflection optical device according to claim 9, wherein the following relationship is satisfied:

$$0.95 \leq \text{Fno.} \leq 3.1$$

where Fno. denotes an open F value in a plane including the vertices of the four reflection surfaces.

13. The reflection optical device according to claim 12, wherein the following relationship is satisfied:

$$\text{Fno.} \leq 1.9.$$

14. The reflection optical device according to claim 12, wherein the following relationship is satisfied:

$$\text{Fno.} \leq 1.6.$$

15. The reflection optical device according to claim 1, wherein the number of the plural reflection surfaces is four and the following relationships are satisfied:

$$0.95 \leq \text{Fno.} \leq 3.1$$
$$3 \leq \text{Wy} < 10$$

where Fno. denotes an open F value in a plane including the vertices of the four reflection surfaces, and Wy (deg) denotes a half angle of view in the Y direction in a plane including the vertices of the reflection surfaces in the rectangular coordinate system (X, Y) in which the X direction is a direction perpendicular to a plane including the center of the image surface and the

vertices of the reflection surfaces and the Y direction is a tangential direction at a vertex included in this plane.

16. The reflection optical device according to claim 15, wherein the following relationship is satisfied:

$$Fno. \leq 1.9.$$

17. The reflection optical device according to claim 15, wherein the following relationship is satisfied:

$$Fno. \leq 1.6.$$

18. The reflection optical device according to claim 1, wherein the number of the plural reflection surfaces is four and the following relationships are satisfied:

$$1.1 \leq Fno. \leq 3.1$$
$$10 \leq Wy < 20$$

where Fno. denotes an open F value in a plane including the vertices of the four reflection surfaces, and Wy (deg) denotes a half angle of view in the Y direction in a plane including the vertices of the reflection surfaces in the rectangular coordinate system (X, Y) in which the X direction is a direction perpendicular to a plane including the center of the image surface and the vertices of the reflection surfaces and the Y direction is a tangential direction at a vertex included in this plane.

19. The reflection optical device according to claim 18, wherein the following relationship is satisfied:

$$Fno. \leq 1.9.$$

20. The reflection optical device according to claim 18, wherein the following relationship is satisfied:

$$Fno. \leq 1.6.$$

21. The reflection optical device according to claim 1, wherein the number of the plural reflection surfaces is four and the following relationships are satisfied:

$$1.4 \leq \text{Fno.} \leq 3.1$$
$$20 \leq \text{Wy} < 30$$

where Fno. denotes an open F value in a plane including the vertices of the four reflection surfaces, and Wy (deg) denotes a half angle of view in the Y direction in a plane including the vertices of the reflection surfaces in the rectangular coordinate system (X, Y) in which the X direction is a direction perpendicular to a plane including the center of the image surface and the vertices of the reflection surfaces and the Y direction is a tangential direction at a vertex included in this plane.

22. The reflection optical device according to claim 21, wherein the following relationship is satisfied:

$$\text{Fno.} \leq 1.9.$$

23. The reflection optical device according to claim 21, wherein the following relationship is satisfied:

$$\text{Fno.} \leq 1.6.$$

24. The reflection optical device according to claim 1, wherein the shape of at least one surface of the plural reflection surfaces is a free-form surface that does not have a rotational central axis.

25. An image pickup device comprising a reflection optical device according to claim 1 and a detector for converting light intensity into an electric signal.

26. The image pickup device according to claim 25, wherein the detector is a two-dimensional image pickup element.

27. The image pickup device according to claim 25, wherein the detector has sensitivity with respect to light beams in the infrared region.

28. A multiwavelength image pickup device comprising a reflection optical device according to claim 1 and a detector having sensitivity with respect to light beams in plural different wavelength bands.

29. The multiwavelength image pickup device according to claim 28, wherein the detector has a light flux dividing member for dividing light fluxes into light fluxes in different wavelength bands and detection surfaces corresponding to the plural divided wavelength bands.

30. A multiwavelength image pickup device comprising the reflection optical device according to claim 1 and the detector having plural regions, which have sensitivity with respect to light beams in different wavelength bands, in the same detecting plane.

31. A vehicle-mounted monitoring device, comprising the image pickup device according to claim 25 and a display for conveying a picked-up picture image to a driver.

32. A vehicle-mounted monitoring device, comprising the multiwavelength image pickup device according to claim 28 and a display for conveying a picked-up picture image to a driver.